

Amendments to the Drawings:

The attached sheet of drawings includes changes to FIG. 5. This sheet, which includes FIG. 5, replaces the original sheet including FIG. 5.

REMARKS

Claim 45 has been amended to recite “a rocket motor case, a skirt and a shear ply interposed between and connecting the rocket motor case and the skirt.” Support for this amendment may be found throughout the as-filed specification, for example, at at least paragraphs [0014] and [0035]. Claims 58 and 59 have been amended to recite the term “about.” Support for the amendments is found in the as-filed specification in at least original claims 14 and 15.

In the specification, paragraph [0023] has been amended to include the language “[f]or example, carbon-carbon double bonds in each of the first hydrogenated nitrile conjugated-diene copolymer and the second hydrogenated nitrile conjugated-diene copolymer may be hydrogenated to 85% to 95% saturation. Further, the carbon-carbon double bonds in each of the first hydrogenated nitrile conjugated-diene copolymer and the second hydrogenated nitrile conjugated-diene copolymer may be hydrogenated to 90% to 92% saturation.” Support for this amendment is found in the as-filed specification in at least original claims 14 and 15.

In the drawings, FIG. 5 has been amended. Support this amendment is found throughout the as-filed specification, in particular, at paragraph [0014].

The Office Action mailed May 24, 2007, has been received and reviewed. Claims 45-76 are currently pending in the application, of which claims 45-61 are currently under examination. Claims 62-76 have been withdrawn from consideration as being drawn to a non-elected invention and are canceled herein without prejudice or disclaimer to the filing of one or more divisional applications including the subject matter thereof. Claims 45-61 stand rejected.

Applicants respectfully request reconsideration of the application as amended herein.

Claim Interpretations

The Examiner asserts that “the only constituent to which patentability may be ascribed would be in the composition of the ‘shear ply’ and not to any arrangement thereof in a rocket motor.” *See* Office Action of May 24, 2007, p. 2. The Examiner bases this assertion on an argument allegedly made by Applicants in the Appeal Brief of March 5, 2007, while addressing an enablement rejection. However, in that argument, Applicants merely stated that based on the

knowledge of rocket motor assemblies in the art, the description in the as-filed specification of a shear ply used in a rocket motor assembly would enable one of ordinary skill in the art to make or use the presently claimed invention without undue experimentation. Applicants maintain this statement and submit that this statement does not admit that patentability can only be ascribed to the composition, as asserted by the Examiner. Furthermore, it is respectfully submitted that neither the arguments made by Applicants in the Appeal Brief nor those made by the Examiner in the instant Office Action provides any support that the claims should be interpreted in the manner asserted by the Examiner.

As such, it is respectfully requested that the entirety of the pending claims be considered by the Examiner, including the limitation of “a rocket motor case, a skirt and a shear ply interposed between and connecting the rocket motor case and the skirt” as recited in claim 45

Specification

The Examiner has asserted that paragraph [0021.1], FIG. 5 and the amendment to paragraph [0035] are new matter. Applicants respectfully disagree.

It is respectfully submitted that FIG. 5 and paragraphs [0021.1] and [0035], which were presented in Applicants' Response filed on August 11, 2006, are supported by the as-filed specification and, thus, does not constitute new matter under 35 U.S.C. §132. FIG. 5 has been amended to graphically depict a rubber shear ply 2 interposed between a rocket motor case 4 and a skirt 6 of the rocket motor assembly 8. Support for FIG. 5 is found throughout the as-filed specification, in particular, at paragraph [0014] which describes “providing a rubber shear ply comprising the rubber component of this invention and interposing the rubber shear ply between a skirt and a composite rocket motor case of a rocket motor assembly.” See the as-filed specification at paragraph [0014]. Thus, FIG. 5 merely illustrates the rocket motor assembly that is described in paragraph [0014] of the as-filed specification. Paragraphs [0021.1] and [0035] provide a brief description of FIG. 5. Since FIG. 5 is supported by the as-filed specification, paragraph [0021.1] and the newly added sentence of paragraph [0035] are also supported by the as-filed specification. Because FIG. 5 and paragraphs [0021.1] and [0035] at least conform to paragraph [0014] of the specification as originally filed, FIG. 5 and paragraphs [0021.1] and

[0035] do not constitute new matter. Thus, it is respectfully submitted that the objection be withdrawn.

35 U.S.C. § 112 Claim Rejections

Claims 58 and 59 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was allegedly not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

It is noted that “[t]he claims as filed in the original specification are part of the disclosure and therefore, if an application as originally filed contains a claim disclosing material not disclosed in the remainder of the specification, the applicant may amend the specification to include the claimed subject matter.” M.P.E.P. §2163.06 (III).

Furthermore, M.P.E.P. §608.01(I) provides:

“[i]n establishing a disclosure, applicant may rely not only on the description and drawing as filed but also on the original claims if their content justifies it. Where subject matter not shown in the drawing or described in the description is claimed in the application as filed, and such original claim itself constitutes a clear disclosure of this subject matter, then the claim should be treated on its merits, and requirement made to amend the drawing and description to show this subject matter. The claim should not be attacked either by objection or rejection because this subject matter is lacking in the drawing and description. It is the drawing and description that are defective, not the claim.”

Since claims 58 and 59 recite the subject matter of original claims 14 and 15, respectively, these claims are supported by the as-filed specification. In addition, Applicants have amended the as-filed specification at paragraph [0023] to include the subject matter of originally filed claims 14 and 15, as required under M.P.E.P. § 608.01(I). Based on these amendments, it is respectfully submitted that claims 58 and 59 meet the written description requirement under 35 U.S.C. § 112, first paragraph.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 6,554,936 to Metcalf *et al.*, U.S. Patent No. 5,257,761 to Ratz *et al.*, U.S. Patent No. 4,953,476 to Sayles or U.S. Patent No. 3,620,901 to Hartz *et al.*, taken each in view of U.S. Patent No. 5,860,883 to Jonen *et al.*, U.S. Patent No. 6,240,993 to Onaka *et al.*, U.S. Patent No. 6,352,488 to Morris *et al.*, U.S. Patent No. 6,443,866 to Billups or U.S. Patent No. 6,739,854 to Nagata *et al.*

Claims 45-61 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,554,936 to Metcalf *et al.* (“Metcalf”), U.S. Patent No. 5,257,761 to Ratz *et al.* (“Ratz”), U.S. Patent No. 4,953,476 to Sayles (“Sayles”) or U.S. Patent No. 3,620,901 to Hartz *et al.* (“Hartz”), taken each in view of U.S. Patent No. 5,860,883 to Jonen *et al.* (“Jonen”), U.S. Patent No. 6,240,993 to Onaka *et al.* (“Onaka”), U.S. Patent No. 6,352,488 to Morris *et al.* (“Morris”), U.S. Patent No. 6,443,866 to Billups (“Billups”) or U.S. Patent No. 6,739,854 to Nagata *et al.* (“Nagata”). Applicants respectfully traverse this rejection, as hereinafter set forth.

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 985 (CCPA 1974); *see also* MPEP § 2143.03. Additionally, there must be “a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements” in the manner claimed. *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1742, 167 L.Ed.2d 705, 75 USLW 4289, 82 U.S.P.Q.2d 1385 (2007). Finally, to establish a *prima facie* case of obviousness there must be a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Furthermore, the reason that would have prompted the combination and the reasonable expectation of success must be found in the prior art, common knowledge, or the nature of the problem itself, and not based on the Applicant’s disclosure. *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006); MPEP § 2144. Underlying the obvious determination is the fact that statutorily prohibited hindsight cannot be used. *KSR*, 127 S.Ct. at 1742; *DyStar*, 464 F.3d at 1367.

Furthermore, “[a] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 127 S.Ct. at 1741.

Applicants respectfully submit that a *prima facie* case of obviousness of claims 45-61 has not been established as the combination of applied references does not teach or suggest all of the claim limitations and there is no objective motivation to combine these references to produce the claimed invention.

Metcalf describes an insulative material that may be used to form dome insulators for a rocket motor that includes a vulcanizable rubber, a flame retardant such as zinc borate, a phenolic resin and a cure system constituent, and optional reinforcing fibers. Metcalf at column 8, lines 43-46. The vulcanizable rubber may be, for example, butadiene acrylonitrile (NBR). *Id.* at column 15, lines 44-46. The dome insulators 84, 86 are bonded to a shear-ply layer 82 on the inner surface 81 of the dome shell 80. *Id.* at column 11, lines 15-67. The shear-ply layer 82 includes an elastomeric material containing either silica powder or aramid fibers, such as Kevlar, and a curable rubber such as ethylene propylene diene monomer (EPDM). *Id.* at column 11, lines 11-14.

Ratz describes a shear ply 29 positioned over layers of fiber-reinforced resin 41 on the outer casing of a pressure vessel. Ratz at column 7, lines 34-39. The shear ply includes a resilient material, such as a styrene-butadiene rubber, an acrylonitrile-butadiene rubber, an ethylene-propylene-diene rubber. *Id.* at column 10, lines 55-60.

The background of Sayles describes that an interceptor rocket motor insulation system is typically based on a hydrocarbon prepolymer such as ethylene-propylene-diene monomer (EPDM), acrylonitrile-butadiene rubber (NBR), styrene-butadiene rubber (SBR), or polyisoprene (PIP) rubber. *Id.* at column 1, lines 12-16.

Hartz describes a laminate that is composed of alternate layers of electrically conductive and electrically nonconductive carbonizable, millable elastomeric compositions. Hartz at the Abstract. The electrically conductive layers may include butadiene-acrylonitrile rubber. *Id.* at column 2, lines 54-56.

Jonen describes a power transmission belt with a cushion rubber layer 12 laminated on

one side to a compression rubber layer 16 and on the other side to tension layer 14. Jonen at FIG. 1; column 5, lines 56-67. The cushion rubber layer 12 and the tension layer 14 include butadiene-acrylonitrile rubber hydrogenated nitrile rubber and an unsaturated carboxylic acid metal salt dispersed therein. *Id.* at column 6, lines 14-22; column 7, lines 61-65. Load carrying cords 18 are embedded in and firmly bonded to the cushion rubber layer 12. *Id.* at column 6, lines 6-13. The compression rubber layer 16 includes a blend of hydrogenated nitrile rubber and an unsaturated carboxylic acid metal salt, short fibers and an organic peroxide. *Id.* at column 8, lines 10-18.

Kinoshita describes a transmission belt with load carrying cords 20 in a cushion rubber layer 26 laminated to a tension section 22 and a compression section 24. Kinoshita at column 3, lines 12-21. The compression section 24 may include a hydrogenated nitrile rubber combined with a metal salt of an unsaturated carboxylic acid. *Id.* at column 3, lines 23-30.

Onaka describes a power transmission belt with rubber layers that may include natural rubber, styrene-butadiene rubber, chloroprene rubber, alkylated chlorosulfonated polyethylene rubber, hydrogenated nitrile rubber, mixed polymers of hydrogenated nitrile rubber and metal salts of unsaturated carboxylic acids or combinations thereof. *Id.* at column 5, lines 50-55.

Morris describes a transmission belt 20 with a load-carrying section 23 disposed between a tension section 21 and a cushion section 22. *Id.* at column 3, lines 7-12. The tension section 21 and cushion section 22 include, for example, zinc salts of unsaturated carboxylic acid ester grafted hydrogenated nitrile butadiene elastomers, hydrogenated acrylonitrile-butadiene copolymers, and mixtures thereof.

Billups describes a transmission belt having a tension section, a cushion section, a load carrying section disposed between the tension section and the cushion section, at least one drive surface having a fabric layer bonded to an outer surface of the belt and a layer of thermoplastic located between the fabric layer and the cushion section of the power transmission belt. Billups at the Abstract. Zinc salts of unsaturated carboxylic acid ester grafted hydrogenated nitrile butadiene elastomers may be used to form the tension section 21, cushion section 22 and load carrying section 23. *Id.* at column 2, lines 31-41.

Nagata describes a belt 10 that includes rubber layers sequentially wrapped on a drum 12.

Nagata at column 4, lines 32-33. The rubber layers 20, 26 are made from rubber material, such as natural rubber, butyl rubber, styrene-butadiene rubber, chloroprene rubber, ethylene-propylene rubber, alkylated chlorosulfonated polyethylene, hydrogenated nitrile rubber, and a mixed polymer of hydrogenated nitrile rubber and a metal salt of an unsaturated carboxylic acid, or a mixture of these rubber materials. *Id.* at column 5, lines 54-60.

As a preliminary matter and as described above, Applicants have not tacitly acknowledged that patentability to the claims resides in the shear ply composition. Office Action mailed May 24, 2007, p. 2-3. Furthermore, Applicants note that “the claimed invention must be considered as a whole.” M.P.E.P. § 2141(II). Applicants respectfully submit that patentability resides in the claim as a whole, and that no particular portion of the claim makes it any more patentable than any other portion. As such, Applicants respectfully submit that the Examiner must view the claim as a whole and in its entirety.

The applied references do not teach or suggest all of the limitations of independent claim 45 because the applied references, alone or in combination, do not teach or suggest the limitation of “a rocket motor case, a skirt and a shear ply interposed between and connecting the rocket motor case and the skirt, the shear ply comprising a rubber component cured from a precursor composition comprising: a first hydrogenated nitrile conjugated-diene copolymer modified by a metal salt unsaturated carboxylic acid ester, wherein the first hydrogenated nitrile conjugated-diene copolymer is derived from a first composition comprising a first ethylenically unsaturated nitrile and a first conjugated diene; a second hydrogenated nitrile conjugated-diene copolymer derived from a second composition comprising a second ethylenically unsaturated nitrile and a second conjugated diene, wherein the second hydrogenated nitrile conjugated-diene copolymer is not modified with a metal salt unsaturated carboxylic acid ester; and a curing agent.”

The Examiner asserts that each of Metcalf, Ratz, Sayles and Hartz “specifically shows the conventionality to use nitrile rubbers for shear ply components in rocket engines.” *See* Office Action of May 24, 2007, p. 5. However, the applied references, alone or in combination, do not teach or suggest a shear ply that comprises a rubber component cured from a precursor composition as recited in claim 45. Rather, Metcalf, Sayles and Hartz each describe insulative materials for rocket motor assemblies that contain nitrile rubbers. In addition, the shear ply

material 82 of Metcalf includes an elastomeric material, such as Kevlar (para-aramid), and a curable rubber. Sayles and Hartz do not describe a shear ply, but rather an insulative material. While Ratz describes a shear ply that includes a nitrile rubber (acrylonitrile-butadiene rubber), Ratz does not teach or suggest a shear ply comprising a rubber component cured from a precursor composition as recited in claim 45.

Thus, the Examiner relies on Jonen, Kinoshita, Onaka, Morris, Billups and Nagata to cure the deficiencies of Metcalf, Ratz, Sayles and Hartz. Specifically, the Examiner asserts that each of Jonen, Kinoshita, Onaka, Morris, Billups and Nagata “teaches the manufacture of transmission belts that may comprise a first hydrogenated nitrile conjugated-diene copolymer modified by a metal salt unsaturated carboxylic acid ester, a second hydrogenated nitrile conjugated-diene copolymer and a curing agent.” *Id.* at p. 5. However, none of the applied references, nor any combination thereof, teaches or suggests a shear ply interposed between and connecting a rocket motor case and a skirt, the shear ply comprising a rubber component cured from a precursor composition as recited in claim 45. Thus, Applicants respectfully submit that the claimed invention, as a whole, is not obvious to one of ordinary skill in the art considering the combined teachings of the applied references.

In addition, is respectfully submitted that the obviousness rejection is improper because, without the benefit of hindsight, one of ordinary skill in the art would not be motivated to combine the teachings of the applied references in the asserted manner. The Examiner has provided no objective reason for combining their teachings to produce the claimed invention. Metcalf, Sayles and Hartz describe insulative materials that include nitrile rubbers for use in rocket motors. Ratz describes a shear ply material that may include acrylonitrile-butadiene rubber. While Jonen, Kinoshita, Onaka, Morris, Billups and Nagata describe transmission belts including a hydrogenated nitrile conjugated-diene copolymer modified by a metal salt unsaturated carboxylic acid ester, there is no objective reason that would have prompted the combination of the applied references to form a shear ply interposed between a rocket motor case and a skirt, the shear ply comprising a rubber component cured from a precursor composition as recited in claim 45. As such, one of ordinary skill in the art, without the benefit of hindsight, would not be motivated to combine the shear ply of Ratz with the laminated transmission belts of

Jonen, Kinoshita, Onaka, Morris, Billups or Nagata.

Additionally, Applicants respectfully submit that the Examiner's alleged motivation for combining the applied references is conclusory and is not sufficient to establish a *prima facie* case of obviousness. The Examiner acknowledges that Metcalf, Ratz, Sayles and Hartz do not teach or suggest a nitrile butadiene rubber having the recited acrylonitrile content and relies on Jonen, Kinoshita, Onaka, Morris, Billups and Nagata as teaching this limitation. *See* Office Action of May 24, 2007, p. 5. The Examiner states that the since the primary references all show the conventionality of using nitrile rubbers for the shear ply, the use of the rubber compositions of the secondary references would be obvious to a practitioner. *Id.* at p. 6. However, in the absence of an objective reason that would have prompted a person of ordinary skill in the art to combine the elements of a rocket motor assembly with those of a transmission belt, it is respectfully submitted that the obviousness rejection 35 U.S.C. § 103(a) is improper.

Since the applied references do not teach or suggest all of the claim limitations and do not there is no objective motivation to combine these references, it is respectfully submitted that the applied references do not support a *prima facie* case of obviousness for claim 45.

Each of dependent claims 44-61 is allowable, among other reasons, for depending from independent claim 45, which is allowable.

ENTRY OF AMENDMENTS

The amendments to claims 45, 58 and 59 should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add new matter to the application.

CONCLUSION

Claims 45-61 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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